

Institutional Report

STANDARDS	PROPOSED CHANGES TO RULES	COMMENTS
Draft May 2014	http://www.ncate.org/LinkClick.aspx?fileticket=BNUATB9XATk%3d&tabid=676	
<u>10.58.518 MATHEMATICS</u>		
(1) The program requires that successful candidates:	(1) The program requires that successful candidates:	
(a) demonstrate knowledge and understanding of and apply the process of mathematical problem solving;	(a) demonstrate knowledge and understanding of and apply the process of mathematical problem solving;	
(b) reason, construct, and evaluate mathematical arguments and develop an appreciation for mathematical rigor and inquiry;	(b) reason, construct, and evaluate mathematical arguments and develop an appreciation for mathematical rigor and inquiry; <u>reason, construct, and evaluate mathematical arguments and develop an appreciation for mathematical rigor and inquiry;</u>	
(c) communicate mathematical thinking orally and in writing to peers, faculty, and others;	(c) communicate mathematical thinking orally and in writing to peers, faculty, and others; <u>recognize, formulate, and apply connections between mathematical ideas and representations in a wide variety of contexts, and demonstrate understanding of the mathematical modeling process by interpreting and analyzing mathematical results and models in terms of their reasonableness and usefulness;</u>	



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(d) recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematics to build mathematical understanding;	(d) recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematics to build mathematical understanding; recognize, use, and make connections between and among mathematical ideas and in contexts outside mathematics to build mathematical understanding; attend to precision in mathematical language, notation, approximations and measurements by consistently and appropriately applying mathematical definitions, choosing appropriate symbolic representations and labels, specifying units of measure, calculating accurately and efficiently, and expressing numerical answers with a degree of precision appropriate for the context and the data used in calculation;	
(e) use varied representations of mathematical ideas to support and deepen students' mathematical understanding;	(e) use varied representations of mathematical ideas to support and deepen students' mathematical understanding;	
(f) appropriately use current and emerging technologies as essential tools for teaching and learning mathematics; and	(f) (e) appropriately use current and emerging technologies as essential tools for teaching and learning mathematics; and	



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(g) support a positive disposition toward mathematical processes and mathematical learning;	(g) support a positive disposition toward mathematical processes and mathematical learning; <u>(f) look for and recognize repeated reasoning patterns and the mathematical structures behind those patterns to organize and generalize mathematical methods and results in mathematical problem solving and inquiry;</u>	
(2) demonstrate knowledge of how students learn mathematics and of the pedagogical knowledge specific to mathematics teaching and learning;	(2) demonstrate knowledge of how students learn mathematics and of the pedagogical knowledge specific to mathematics teaching and learning <u>by:</u>	
	<u>(a) understanding how learners develop mathematical proficiency through the interdependent processes of integrating conceptual understanding, procedural fluency, strategic competence, adaptive reasoning and productive disposition;</u>	
	<u>(b). understanding individual differences and diverse cultures and communities to ensure inclusive learning environments in mathematics and ensure high standards of mathematical work for all students;</u>	
	<u>(c) demonstrating an understanding of learning environments that promote mathematical learning, including individual and collaborative learning, positive social interaction about mathematics, active engagement in mathematics learning, and promote self-motivation among mathematical learners;</u>	



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	<u>(d) demonstrating an understanding of multiple methods of assessment of mathematical learner growth, progress, and decision making;</u>	
	<u>(e) understanding a variety of instructional strategies that encourage learners to develop deep understanding of mathematics;</u>	
	<u>(f) demonstrating an understanding of grades 5-12 mathematics curriculum as specified by the State of Montana Content Standards and of the assessment process as specified by the Montana statewide assessment;</u>	
(3) demonstrate content knowledge in:	(3) demonstrate content knowledge in:	
(a) numbers and operations by demonstrating computational proficiency, including a conceptual understanding of numbers, ways of representing number relations among number and number systems, and meanings of operations;	(a) numbers and operations by demonstrating computational proficiency, including a conceptual understanding of numbers, ways of representing number relations among number and number systems, and meanings of operations; <u>knowledge and understanding of number systems, arithmetic algorithms, fundamental ideas of number theory, proportion and rate, quantitative reasoning, modeling and applications;</u>	



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(b) different perspectives on algebra including ways of representing mathematical relationships and algebraic structures;	(b) different perspectives on algebra including ways of representing mathematical relationships and algebraic structures; <u>by demonstrating knowledge and understanding of algebraic structures, basic function classes, functional representations, algebraic models and applications, formal structures and results in abstract algebra and linear algebra;</u>	
(c) geometries by using spatial visualization and geometric modeling to explore and analyze geometric shapes, structures, and their properties;	(c) geometries by using spatial visualization and geometric modeling to explore and analyze geometric shapes, structures, and their properties; (c) geometry and trigonometry by demonstrating knowledge and understanding of Euclidean and non-Euclidean geometries, geometric transformations, axiomatic reasoning and proof, formulas and calculations related to classical geometric objects, and properties of trigonometric functions;	
(d) calculus by demonstrating a conceptual understanding of limit, continuity, differentiation, and integration and a thorough background in the techniques and application of the calculus;	(d) calculus by demonstrating <u>a conceptual knowledge and understanding of limit, continuity, differentiation, and integration involving single and multiple-variable functions, sequences and series, and a thorough background in the techniques and application of the calculus;</u>	



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(e) discrete mathematics by applying the fundamental ideas of discrete mathematics in the formulation and solution of problems;	(e) discrete mathematics by applying the fundamental ideas of discrete mathematics <u>demonstrating knowledge and understanding of basic discrete structures, counting techniques, iteration, recursion, formal logic, and applications</u> in the formulation and solution of problems;	
(f) data analysis, statistics, and probability by demonstrating an understanding of concepts and practices related to data analysis, statistics, and probability; and	(f) data analysis, statistics, and probability by demonstrating an understanding of concepts and practices related to data analysis, statistics, and probability; descriptive statistics using numbers and graphs, survey design, sources of bias and variability, empirical and theoretical probability, simulation, and inferential statistics related to univariate and bivariate data distributions; and	
(g) measurement by applying and using measurement concepts and tools.	(g) measurement by applying and using measurement concepts and tools. (g) <u>historical development and perspectives of various branches of mathematics including contributions of significant historical figures and diverse cultures.</u>	
(History: 20-2-114, MCA; <u>IMP</u> , 20-2-121, MCA; <u>NEW</u> , 1979 MAR p. 492, Eff. 5/25/79; <u>AMD</u> , 1984 MAR p. 831, Eff. 5/18/84; <u>AMD</u> , 1989 MAR p. 397, Eff. 3/31/89; <u>AMD</u> , 1994 MAR p. 2722, Eff. 10/14/94; <u>AMD</u> , 2000 MAR p. 2406, Eff. 9/8/00; <u>AMD</u> , 2007 MAR p. 190, Eff. 2/9/07.)		



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